Technical Talk on Mechanistic-Empirical Pavement Design with Hexagonal Geogrids

GEOTECHNICAL ENGINEERING TECHNICAL DIVISION

reported by

Ir. EG Balakrishnan

Mr. Piotr Mazurowski from Tensar International gave an evening talk on Mechanistic-Empirical Pavement Design (M-E) with Hexagonal Geogrids on 19 September, 2017, at the Tan Sri Prof. Chin Fung Kee Auditorium, Wisma IEM. Mr. Mazurowski has over 17 years' experience in pavement and geotechnical engineering.

The talk was organised by the Geotechnical Engineering Technical Division, and 38 participants attended. The purpose was to introduce the benefits of hexagonal geogrids in pavement design, the rationale design approach using mechanistic-empirical methods incorporating geogrids, the test results and case studies on the use of hexagonal geogrids. This method is an elegant approach to pavement design, incorporating sound theoretical knowledge and empirical testing of pavement materials under traffic loading.

First, Mr. Mazurowski introduced the concept of Mechanically Stabilised Layer (MSL). The bearing capacity of MSL is improved where the aggregate particles are confined within the stiff geogrid appertures through the mechanism of interlocking. He presented a short overview of the M-E design methods in 3 stages:

1. Pavement modelling in layered elastic analysis software.
2. Calculation of pavement response (strains & stresses) to single ESAL.
3. Calculation of pavement life for the pavement layers – number of ESAL to reach damage level using transfer functions (fatigue criteria).

Speaker delivering the talk

The design of flexible pavements using MSL, allows reduction of pavement layers (including asphalt layers) while maintaining pavement life or increasing pavement life and maintaining the thickness or a combination of both.

The modelling of the hexagonal geogrids in the pavement design method is carried out by:

1. Using Stiffness Enhancement Concept where the stiffness of unbound aggregates is increased in Linear Elastic Analysis (LEA).
2. Using Stiffness Retention Concept where it is modelled with shift factors. In post LEA, the calculated life (fatigue and subgrade deformation life) is multiplied by a shift factor.

The results of the following tests were carried out to validate the performance of MSL and the stiffness increase using hexagonal geogrids:

1. Accelerated plate bearing tests, triaxial tests and PennState Smart Particle tests.
2. Full scale accelerated pavement testing was used to calibrate the empirical based shift factors.

Mr. Mazurowski also presented the following case studies where hexagonal geogrids and the design method had been successfully implemented, tested and validated.

1. Finningley & Rossington Route Regeneration Scheme (UK)
2. Rzepin By-pass – Voivodeship Road (Poland)
3. Test section in Gliwice (Poland).

Finally, he took questions from the floor, after which he was presented with a token of appreciation and the seminar ended at 7.00 p.m. ■